

1 CLAIMS

2 Having thus described our invention, what we claim as new and  
3 desire to secure by Letters Patent is as follows:

4 1. A method for classifying a data packet, the method  
5 comprising:

6 receiving the data packet at a root node of a classification  
7 tree;

8 successively passing the data packet to each child of a first  
9 tree level until a first child of the first tree level of the  
10 classification tree indicates a satisfaction of a node-criteria  
11 of said first child, and the first child forming said data packet  
12 into a matched packet; and

13 repeating the step of passing and forming for a next tree  
14 level until no first child of said next level at a succeeding  
15 next level indicates satisfaction of the node-criteria of said  
16 first child of said next level.

17 2. A method as recited in claim 1, wherein the step of passing  
18 includes executing a set of code which returns a status  
19 indication.

20 3. A method as recited in claim 1, wherein the step of forming  
21 includes the first child specifying a set of code to be run  
22 subsequently.

1 4. A method as recited in claim 3, wherein the step of  
2 specifying includes specifying the set of code to be run  
3 following satisfaction.

4 5. A method as recited in claim 1, further comprising  
5 dynamically adding at least one node in at least one level of the  
6 classification tree.

7 6. A method as recited in claim 5, wherein said at least one  
8 new child node is a Real Audio node.

9  
10 7. A method for classifying a packet, said method comprising  
11 suspending a packet classification process in progress for said  
12 packet; and obtaining external information employed in said  
13 classifying.

14 8. A method in claim 7, wherein the step of obtaining includes  
15 augmenting a node-criteria of a node in a classification tree  
16 with external information.

17 9. A method as in claim 8, wherein the external information  
18 includes identification of the originator of said packet.

19 10. A method as in claim 8, wherein the external information  
20 includes authentication of an originator of said packet.

21 11. A method as recited in claim 7, wherein the classification  
22 process is an extendible classifier process.

1 12. A method as recited in claim 1, further comprising the step  
2 of parsing said matched packet and generating relevant  
3 information.

4 13. A method as recited in claim 1, further comprising the step  
5 of transforming said matched packet into a transformed packet.

6 14. A method as recited in claim 1, further comprising  
7 associating the packet with a last first child indicating  
8 satisfaction.

9 15. A method as recited in claim 14, further comprising  
10 executing a set of code in accordance with said last first child.

11 16. A method as recited in claim 1, further comprising  
12 determining a disposition of the data packet.  
13

14 17. A method for determining disposition of a packet received at  
15 a child node, said method comprising:

16 passing said packet and a first disposition of said packet to an  
17 external process; and

18 said external process augmenting the packet disposition by  
19 employing a process specific means; and returning the augmented  
20 packet and an augmented disposition to the child node.

21 18. A method as recited in claim 17, further comprising  
22 suspending a disposition process in progress for said packet.

1 19. A method as in claim 18, wherein the augmented disposition  
2 includes identification of an originator of said packet.

3 20. A method as in claim 18 wherein the augmented disposition  
4 includes authentication of an originator of said packet.

5 21. A method as recited in claim 18, wherein the disposition is  
6 employed for policy enforcement.

7 22. A method as recited in claim 16, further comprising  
8 employing the classification process as a firewall.

9 23. A method as recited in claim 1, further comprising employing  
10 the classification process for application level classification.

11 24. A method as recited in claim 23, further comprising  
12 employing the classification process for policy enforcement.

13 25. A method as recited in claim 23, further comprising  
14 employing the classification process for rate limiting.

15 26. A method as recited in claim 23, further comprising  
16 employing the classification process for load balancing.

17 27. A method as recited in claim 1, further comprising employing  
18 the classification process to shape traffic .

19 28. An apparatus to classify a data packet, the apparatus  
20 comprising:

1 a network interface device to receive the data packet from the  
2 physical network and pass the data packet to the root node of a  
3 classification tree, and the reverse, to receive the data packet  
4 from the root node and send the data packet to the physical  
5 network;

6 a packet module to successively pass the packet from child  
7 node to child node at a next tree level until a first child node  
8 of the next tree level of the classification tree which indicates  
9 a satisfaction of a node-criteria of the first child node, and to  
10 form the data packet into a matched packet until no first child  
11 node of at a succeeding next level indicates satisfaction of the  
12 first node-criteria of the first child node of the succeeding  
13 next level.

14 29. An apparatus as recited in claim 28, wherein a portion of  
15 the apparatus is implemented as an accelerator chip.

16 30. An apparatus as recited in claim 28, wherein the apparatus  
17 is employed for application level classification.

18 31. An apparatus as recited in claim 28, wherein the apparatus  
19 is employed as a firewall.

20 32. An apparatus as recited in claim 28, wherein the apparatus  
21 is employed as a border server.

22 33. A method as recited in claim 2, wherein the status  
23 indication is of the pm\_t type.

1 34. An article of manufacture comprising a computer usable  
2 medium having computer readable program code means embodied  
3 therein for causing classification of a data packet, the computer  
4 readable program code means in said article of manufacture  
5 comprising computer readable program code means for causing a  
6 computer to effect the steps of claim 1.

7 35. An article of manufacture as recited in claim 34, the  
8 computer readable program code means in said article of  
9 manufacture further comprising computer readable program code  
10 means for causing a computer to effect dynamically adding at  
11 least one node in at least one level of the classification tree.

12 36. An article of manufacture comprising a computer usable  
13 medium having computer readable program code means embodied  
14 therein for causing classification of a data packet, the computer  
15 readable program code means in said article of manufacture  
16 comprising computer readable program code means for causing a  
17 computer to effect the steps of claim 8.

18 37. A computer program product comprising a computer usable  
19 medium having computer readable program code means embodied  
20 therein for causing a determination of a disposition of a packet,  
21 the computer readable program code means in said computer program  
22 product comprising computer readable program code means for  
23 causing a computer to effect the steps of claim

24 18.

25 38. An apparatus for classifying a data packet, the apparatus  
26 comprising:

1 means for receiving the data packet at a root node of a  
2 classification tree;

3 means for successively passing the data packet to each child  
4 of a first tree level until a first child node of the first tree  
5 level of the classification tree indicates a satisfaction of a  
6 node-criteria of said first child node, and the first child node  
7 forming said data packet into a matched packet; and

8 means for repeating the steps of passing and forming for a  
9 next tree level until no first child node of said next tree level  
10 at a succeeding next level indicates satisfaction of the  
11 node-criteria of said first child node of said succeeding next  
12 level.

13 39. An apparatus for determining disposition of a packet  
14 received at a child node, said apparatus comprising:

15 an interrupt context of a control program, said child node  
16 existing within the interrupt context;

17 an external process outside of the interrupt context of the  
18 control program;

19 means for passing said packet and a first disposition of said  
20 packet to the external process, said external process to augment  
21 the packet disposition by employing a process specific means and  
22 to return an augmented packet with an augmented disposition to  
23 the child node; and

1 said interrupt context including means for receiving said  
2 augmented packet and said augmented disposition from said  
3 external process.